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manual of North American Pyrenomycetes which, when it appears, will undoubtedly give a great impetus to the study of fungi in this country. Long may he remain in our midst working with and for us! Despite a checkered and toilsome life in past years, often in financial straits, and always burdened with delicate health, he has probably done more than any other man in America to advance the knowledge of our native fungi and to stimulate the ardor of every student of mycology.

New York City.

Notes on the flora of the Lake Superior Region. III.

II. VERMILION LAKE, MINNESOTA.

E. J. HILL.

From the copper region of Keweenaw Peninsula I went to Vermilion Lake, the center of the iron mining of Minnesota. The passage by boat from Houghton to Duluth affords some fine views of scenery along the south shore of Lake Superior, since, for one day at least, daylight will be had. Of these, the most noteworthy are Porcupine Mountain, near Ontonagon, and Ashland and Bayfield with their beautiful bay and the outlying Apostle Islands, and the traveler will not soon forget his first sight of Duluth from the water below, or the climb to the hills above to see the city from another outlook, a terraced city with streets rising one above the other on the rocky slope, making it possible to get a birdseye view of the place from a single spot, as it spreads like a map before you. From here one goes by the Duluth and Iron Range Railroad, a ride of a hundred miles, to Tower, on Vermilion Lake. For a third of the way the road runs along the shore of Lake Superior, though the sight of the lake is cut off a good part of the time by intervening woods, as the road keeps near the foot of the hills which come down rather steeply, leaving a strip of more level land between them and the beach. The trees are mostly of the hardwood kinds, interspersed with conifers. On reaching Two Harbors, the shipping point of the iron of the adjoining region, the road turns abruptly away from the lake, and for the rest of the way is little more than a lane cut through the woods. Scarcely a settlement is seen till within a few miles of Tower, the house or two, when a station occurs, being for the employees of the road.

As the railroad winds about among the low drift hills or cuts through the ledges of rock or drift, crossing a small river now and then, the passenger finds little to do outside but study the trees and boulders along the way. It soon becomes monotonous, the nearer view being too often the inevitable burnt district of bare and blackened trunks skirting the road on either side, with a rank growth of weeds and brambles, or seedlings of maple and oak, along with the elm and maple, and the ever present paper birch, its white trunk sharply limned on the surrounding green or gray. One sees many tracts of pine, the red, the white, and occasionally the gray. The trees of the economic kinds are generally small, and few of the logs seen at the mills in Tower were more than fifteen inches in diameter, the average being even less. This would not appear to be because the largest have been culled, though this may be true to some extent, but because the trees are naturally of smaller size. I noticed the same, the year before, at the entensive mills at Chicoutimi on the Saguenay. It is true the yellow pine is always somewhat small and slender, but though some larger boles of white pine were occasionally seen, they nowhere showed the vigorous habit of those found in Michigan and Wisconsin, if haply a wood untouched by fire at all were met with. There is much swampy land, not generally in large areas, but frequent patches of low ground left by the retreating ice-sheet of the great glacier, whose evidence is seen on every exposed outcrop of scored and planed rocks, hollows strewn with boulders, over which is spread a covering of peat, a congenial soil for tamarack, spruce and cedar. These hidden boulders become visible when a fire has perchance attacked the drier parts in a time of drought, and they lie so close as to almost touch each other. The soil is unusually thin, of a clayey or sandy loam, reddish with iron-oxide in the vicinity of the iron ranges. As usual, the pines predominate on the sandy soils and rocky hills. With boulders so thickly spread in many places that they may serve as stepping-stones, and ledges of rock outcropping on every hand, it will pass for a rugged country, much of it of slight use to agriculture, and of little attraction to the eye after the covering of timber is removed. There are spots by the lakes and streams fit for the plow, and the "homesteader" is already there, finding a fair requital for his labors in a quick-growing crop. Some of the water courses between the hills are marvels of stoniness, a lengthened pile of boulders of all shapes and sizes, as if washed out of the contiguous slopes and rolled into the valley, or left to accumulate one above the other as the softer earth has been carried to a lower level. Walking over these one hears the water making its way among them beneath his feet, out of sight and often out of reach should he seek a cooling draught. Here, as in northern Michigan, when the timber is removed, if the soil is not too sandy, a growth of maples soon springs up, and on the sandy and rocky soils one of oaks, the damp lands of either kind yielding one of poplar.

Vermilion Lake is a stretch of water about as irregular in outline as can well be imagined. As depicted on a map it may be described as amoebiform. Abounding in islands and rocks, most of them covered with trees, and with long tongues of land jutting into it, not much of it is visible at once from any part of its shores or surface. Yet it furnishes many delightful views from its waters or the surrounding shores and heights. Passing over it by boat these views are continually changing. With a length of thirty miles, it is said to have, including its island shores, a coast line of more than two hundred miles. Two streams enter it at Tower, East Two Rivers and West Two Rivers. These offer reaches of marshy and overflowed land, as they bring down the sediment and gradually fill the lake at this point, the mouths of the two streams being near each other. Through these low flats of aquatic plants the streams wind with a sluggish current, in marked contrast to the rate of flow when the rocks of the surrounding woods are reached. Rowing up the larger stream to examine and collect the plants, the ride came to a sudden end when this boundary was attained.

Such, in brief, is the nature of the country at Vermilion Lake, in which twelve days in the latter half of August were spent in studying its flora. It did not materially differ in its general features from that just left in northern Michigan, the later season of collecting offering the main distinction. The Compositæ were out in greater numbers, but there were none of special interest that need be recorded here. It was in other groups of plants that I found most of profit.

Ranunculus multifidus Pursh , var. *terrestris* Gray, was detected in one locality near Tower, along the bank of East Two Rivers, near the railroad crossing. It does not look much like the floating plant, and at sight would hardly be thought to have any specific relation to it, being in habit and appearance much more like R. Cymbalaria and R. Flammula, var. reptans. Its mode of growth is almost identical with the latter, and it affects about the same conditions of soil and dampness, or perhaps where it is a little more muddy, or with less of sand and gravel. The stems are small, creeping about and rooting at the joints. None of the leaves are dissected, but are reniform, and usually three to five-cleft. The flowers are small, from a fourth to a half inch in diameter, bright yellow, and of eight to ten parts. In the bud three of these enclose the rest, making an outer whorl of three which I take to be the sepals, two of the edges imbricate and one valvate or a little spaced, as figured by Eichler[1] for R. Ficaria and the involucre of Anemone Hepatica, though not as in La Maout et Decaisne,[2] where the three are figured as imbricating. The next whorl is of three, alternating with the sepals. The succeeding parts did not seem exactly as in the Ficaria group, being more developed on one side than on the other, so that the deviation may have been due to the immaturity of the material, the buds being studied after my return and not from fresh material in the field, as this feature of the plant did not at first attract attention, though several of the dried buds were analyzed. This should be looked into by those who can have access to abundance of material. The fruit also does not agree very well with that of R. multifidus. Aside from its much smaller size, it has a recurved or uncinate beak. I looked for R. multifidus in the adjoining stream, thinking this might be a variety of that plant, but did not find any, nor did I meet with it in any place about town. The question whether the two are of the same species will bear further investigation. The description in the last edition of the Manual varies somewhat from that given in the preceding, where it is said the upper leaves are reduced to oblong or linear bracts. The terminal division of the leaves is three-lobed, the latter generally two-lobed or cleft, and the upper leaves are mostly of the form of the terminal division, which rarely is reduced to the middle lobe, like an oblong bract. The mass of the leaves is quite uniform in shape and lobation, the tendency being to a ternate division both of main and secondary parts.

Another of the *Ranunculaceæ* of more than common interest was *Caltha natans* Pallas, new to the United States. It has hitherto been known in North America as belonging to British America, and is described by Hooker and Richardson as creeping on the surface of deep sphagnous bogs.

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[1] Blüthendiagramme, II Theil, fig. 60, 63.

[2] Traité de Botanique, p. 391.

Those found in Minnesota were in pools and ditches along the railroad, first seen about ten miles east of Tower, and then in running water nearer the town. Once it was found in a streamlet by a wood's path between the village and the iron mines, where the water had quite a current. Macoun also mentions its growth in flowing water. It has but little resemblance to the common marsh marigold, except in the shape of the leaves. These are much smaller and rest upon the water, borne on petioles of varying length. The stem creeps in the ooze of the bottom, sending out roots from the nodes, the upper part floating. It has inconspicuous flowers, a third of an inch across, commonly two on a forked peduncle. Their color is pale pink. None were seen purely white. The anthers were also tinged with pink. Pursh (Flora, 390, under C. flabellifolia) says that the flowers of the specimens collected by Pallas in eastern Siberia, which he saw in Herb. Lambert, were "white with a tinge of red." The head of fruit is roundish, half an inch in diameter, composed of 20–30 pitted follicles. The stations for this plant mentioned in Macoun's catalogue are several hundred miles to the northwest, at the headwaters of the Saskatchewan and Athabasca rivers, Peace river tributaries and Methy river, near Methy Portage. The latter is in latitude 57°, or about 900 miles from Tower. On the authority of Hooker he gives it as occurring in the central districts from the eastern provinces to latitude 60°, but with the question mark after the eastern provinces. Tower is in latitude 48°.

The only Lechea seen was one called by Mr. W. H. Leggett, who had given special attention to these plants, *L. minor* Lam., var. *stricta*. It grows on sandy hills, especially those thinly covered with Pinus Banksiana and P. resinosa, where the ground is not too much shaded and on rocky hills and ledges with a thin covering of soil, on the top of one of which, Jasper Peak, the highest point in the vicinity of Tower, I found it common. It is the same form as was found in 1882 in the Northern Peninsula of Michigan in the Menominee iron region, growing in light, sandy soil. It is also the most abundant Lechea around Chicago, unless we except *L. major* Mich., and is found elsewhere in northern Illinois. It is not granted varietal distinction in the revised Manual, though well marked and easily recognized by several characters, as its strict mode of growth, numerous appressed branches thickly covered with fruit, its common habit of sending up several stems from the same root, its copious supply of radical shoots late in the season, usually making a somewhat dense, cushiony tuft spreading nearly flat on the ground. Having sent Mr. Leggett some forms of L. minor quite different in mode of branching and growth, more bushy and with a distinct habitat, readily detected by its appearance, he concluded that L. minor, var. stricta, was specifically distinct, but I do not think a characterization was ever published, or perhaps made out, as it was not long before his death. I find no tendency in the forms growing here to grade into one another, and they are distinguished without difficulty. What appears to be the same has been sent me from New England, and I think it likely that the one Mr. Leggett distributed as L. minor, var. intermedia, should go with it, though somewhat coarser and with larger fruit. Having gathered from different sections considerable material which goes by the name of *L. minor* Lam., much of it proves unsatisfactory in classification, and the last word has hardly been said about this difficult genus. Of the two plants found at the West and North, it may be added that one, having the strict habit of growth, is met with in open places of dry woods, or along their borders, or in fields, such places as are frequented by L. major, while I have always found the others among the low bushes, between the dry sands and the wet margins of sloughs, conditions of soil which in open places furnish a congenial home for L. thymifolia Michx. A little experience soon shows where to look for either, and the other need not be sought under the same conditions, though it may occur in the immediate vicinity. These habitats are so characteristic and constant that I have sometimes tested the matter by selecting beforehand from some more elevated place spots where each might be looked for, and then verified the fact by finding the respective kinds, if either was present.

An interesting form of Impatiens fulva was found in the woods, growing with the typical plant. The flowers were whitish mottled with red spots, the general effect by blending of colors being pink. It was plentiful in the single locality where it occured.

Fine specimens of three closely-related species of Papilionaceæ grew in company on the hills from which the timber had been burned, and where bushes and brakes had sprung up thickly. These were Vicia Americana, Lathyrus venosus and L. ochroleucus. All were very vigorous plants. The Vicia was high-climbing and slightly pubescent. The upper part of the stem of L. venosus and the lower surface of its leaves were downy. The flowers of L. ochroleucus were very pale, barely tinged with yellow.

Rosa Engelmanni Watson was the most common species of rose seen in the region, exceeding in abundance R. Carolina, the only other kind noticed. Along the shore of Vermilion Lake the bushes sometimes reached a height of six or seven feet, and almost everywhere had a remarkably thrifty look. There is an appearance about the plant not altogether easy to describe, since it appeals to the eye and needs to be seen for adequate appreciation, though it may in general be designated by thriftiness. This makes it look quite different from R. blanda, with which it is apt to be confounded. It is very leafy and has large, well pronounced leaflets, broad in proportion to their length as compared with R. blanda, though not always so, usually softly pubescent as well as the upper part of the stem. The time of flowering had passed, but as the fruit is one of the main distinctions, it was easy to identify. It is a handsome shrub, with its large prominently-veined leaflets, palish and finely set off by an abundance of red or reddish-yellow fruit. The younger shoots are sometimes glaucous as well as the leaves beneath. The hips were mainly obovate-oblong, rather more than half an inch in length. The size of the bushes varied with the soil; in lower and fertile ground they were tall and branching more freely, in poor soil, such as supported Pinus Banksiana, low and more slender.

These specimens from Minnesota in connection with the description and figure of the plant in *Garden and Forest* for August 7, 1889, enabled me to determine the presence of R. Engelmanni in our pine barren region on returning home in September. Several specimens of the genus Rosa, whose study had not been satisfactory before, were collected in June and July while in flower, and the localities and bushes marked so as to obtain the fruit when mature. There was one form assigned with some misgivings to R. blanda since it did not very well agree with it. They were usually plants of a strong habit of growth, with large and abundant blossoms, remarkably striking when racemosely arranged on short side branches along the more simple stemmed forms, sometimes for a space of two feet, all in flower at once, and quite wand-like in look. On going to these spots in the fall I found the bushes covered with oblong fruit and presenting the same general appearance as those about Tower. The fruit in the Lake Michigan specimens is oblong, so far as observed, tapering about equally above and below from the middle; subsequently I observed it in several places in Lake county, Indiana. It is taller and more robust in peaty or wettish ground, reaching in one case a height of six feet, and lower in the sands where it grows with P. Banksiana. The present season (1890) I have seen it in Cook county, Illinois, within the limits of Chicago, and confidently expect to see it covered with the oblong fruit later in the year. This experience in field study shows that there is more than the fruit to distinguish R. Engelmanni from R. blanda. I was not aware of the existence of the former species till the copy of *Garden and Forest* reached me at Tower about the 20th of August. This was more than two months after the specimens had been gathered and selected out for comparison when the fruit should mature, the time of collecting in flower being June 14th. Practically, then, the species can be separated from allied forms at the time of anthesis, and to me it was independent of other help. It is probable that the species will will be found in other localities along Lake Michigan, having evidently been overlooked or confounded with R. blanda. I may add that the work of the season, together with that ot 1890, gives five species of Rosa for the vic nity of Chicago, the lake flora taking four, R. Engelmanni, R. blanda, R. Carolina and R. humilis, and the Des Plaines river one, R. setigera. And it should also be added that there are forms of these lake roses which are still troublesome to assign, as there seem to be gradations, perhaps intercrossing, since they often grow freely in close proximity, especially the first three. The first two are commonly two or more weeks earlier in time of flowering, being quite well out of bloom when R. humilis is at its best, and R. Carolina just beginning to open.

Englewood P. O., Chicago, Ill.

BRIEFER ARTICLES.

Simple device for illustrating hydrotropism.—Take an ordinary nickel plated clock, remove the thumb-piece at the back which is used to turn the hands, and solder it to the bottom of a cylindrical tin box about two inches in diameter and three or four deep, in which the seeds are to be planted. Now when the thumb piece is slipped back in place on the square shoulder of the shaft which turns the hour hand, the tin box will,